Application Number 10/825,964
Amendment responsive to Office Action mailed August 8, 2007

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

Claims 1-18 (Canceled).

Claim 19 (Currently Amended):   A medical system comprising:

a plurality of sensors, each of the sensors generating a signal as a function of at least one physiological parameter of a patient; and

an implantable medical device that includes a processor that monitors a plurality of physiological parameters of the patient based on the signals output by the sensors, and determines a value of a sleep metric that indicates a non-binary probability of the patient being asleep based on the physiological parameters.

Claim 20 (Previously Presented):   The system of claim 19, wherein the physiological parameters comprise at least one of activity level, posture, heart rate, respiration rate, respiratory volume, or core temperature.

Claim 21 (Previously Presented):   The system of claim 19, wherein physiological parameters comprise at least one of blood pressure, blood oxygen saturation, partial pressure of oxygen within blood, partial pressure of oxygen within cerebrospinal fluid, muscular activity, arterial blood flow, or galvanic skin response.

Claim 22 (Original): The system of claim 19, wherein the processor determines a variability of at least one of the physiological parameters, and determines the sleep metric based on the variability.

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Claim 23 (Original): The system of claim 19, wherein the processor determines at least one of a mean value and a median value of at least one of the physiological parameters, and determines the sleep metric based on the at least one of the mean value and the median value.

Claim 24 (Original): The system of claim 19, wherein the processor determines a value of each of a plurality of sleep metrics, each of the plurality of values determined based on a respective one of the physiological parameters.

Claim 25 (Currently Amended): The system of claim 24, wherein the processor determines a value of an overall sleep metric based on the values of the plurality of sleep metrics.

Claim 26 (Original): The system of claim 25, wherein the processor determines the value of the overall sleep metric by averaging the values of the plurality of sleep metrics.

Claim 27 (Original): The system of claim 26, wherein the processor applies a weighting factor to at least one of values of the plurality of sleep metrics.

Claim 28 (Original): The system of claim 19, further comprising a memory to store a threshold value, wherein the processor compares the value of the sleep metric to a threshold value and determines whether the patient is asleep based on the comparison.

Claim 29 (Original): The system of claim 28, wherein the memory stores a plurality of threshold values, and the processor compares the value of the sleep metric to each of the threshold values and determines a sleep state of the patient based on the comparison.

Claim 30 (Previously Presented): The system of claim 29, wherein the processor determines whether the patient is in one of a rapid eye movement (REM) sleep state or a nonrapid eye movement (NREM) sleep state.

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Claim 31 (Original): The system of claim 28, further comprising a user interface, wherein a user selects the threshold via the user interface.

Claim 32 (Previously Presented): The system of claim 28, wherein the processor controls delivery of a therapy to the patient by the implantable medical device based on the determination of whether the patient is asleep.

Claim 33 (Original): The system of claim 28, wherein the processor stores information indicating when the patient is asleep within the memory for retrieval by a user.

Claim 34 (Canceled).

Claim 35 (Previously Presented): The system of claim 19, wherein the implantable medical device includes the sensor.

Claim 36 (Previously Presented): The system of claim 19, wherein the implantable medical device is coupled to the sensor via a lead.

Claim 37 (Previously Presented): The system of claim 19, wherein the implantable medical device is wirelessly coupled to the sensor.

Claim 38 (Previously Presented): The system of claim 19, wherein the implantable medical device comprises at least one of an implantable neurostimulator or an implantable pump.

Claim 39 (Currently Amended): A system comprising:
       means for monitoring a plurality of physiological parameters of a patient; and
       implantable means for determining a value of a sleep metric that indicates a non-binary
probability of the patient being asleep based on the physiological parameters.

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Claim 40 (Original): The system of claim 39, further comprising means for generating at least one signal as a function of the physiological parameters, wherein the means for monitoring comprises means for monitoring the physiological parameters based on the signal.

Claim 41 (Original): The system of claim 39, wherein the means for determining a sleep metric comprises means for determining a value for each of a plurality of sleep metrics, each of the plurality of values determined based on a respective one of the physiological parameters.

Claim 42 (Original): The system of claim 41, wherein the means for determining a value of a sleep metric comprises means for determining a value of an overall sleep metric based the values of the plurality of sleep metrics.

Claim 43 (Original): The system of claim 41, further comprising means for comparing the value of the sleep metric to a threshold value and determining whether the patient is asleep based on the comparison.

Claim 44 (Original): The system of claim 43, further comprising:

means for delivering a therapy to the patient; and

means for controlling delivery of a therapy to the patient by the therapy delivery means based on the determination of whether the patient is asleep.

Claim 45 (Original): The system of claim 43, further comprising means for storing information indicating when the patient is asleep for retrieval by a user.

Claims 46-52 (Canceled).

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Claim 53 (Currently Amended):   A medical system comprising:

a sensor to generate a signal as a function of a physiological parameter of a patient,

wherein the physiological parameter comprises one of blood pressure, muscular activity, arterial blood flow, or galvanic skin response; and

an implantable medical device that includes a processor to monitor the physiological parameter based on the signal and determine a non-binary probability of the patient being asleep based on the physiological parameter.

Claim 54 (Currently Amended):   The system of claim 53,

further comprising a plurality of sensors that generate a signal as a function of a physiological parameter of a patient,

wherein the processor monitors a plurality of physiological parameters based on the signals and determines the non-binary probability of the patient being asleep based on the plurality of physiological parameters.

Claim 55 (Currently Amended):   The system of claim 54,

wherein the implantable medical device further comprises a memory to store a threshold value, and

wherein the processor determines a value of a sleep metric that indicates a sleep state of the patient based on the plurality of physiological parameters, compares the value of the sleep metric to a threshold value, and determines the non-binary probability of the patient being asleep based on the comparison.

Claim 56 (Currently Amended):   The system of claim 55, wherein the processor determines a value of a sleep metric for each of the plurality of monitored physiological parameters, determines a value of an overall sleep metric based on the values of the plurality of sleep metrics, and determines the non-binary probability of the patient being asleep based on comparison of the value of the overall sleep metric to the threshold.

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Claim 57 (Currently Amended):   The system of claim 53, wherein the processor controls
delivery of a therapy to the patient based on the determination of the <u>non-binary</u> probability of
the patient being asleep.

Claim 58 (Original): The system of claim 53,
        wherein the implantable medical device further comprises a memory, and
        wherein the processor stores information indicating when the patient is asleep within the
memory for retrieval by a user.

Claim 59 (Original): The system of claim 53, wherein the implantable medical device includes
the sensor.

Claim 60 (Previously Presented):   The system of claim 53, wherein the implantable medical
device is coupled to the sensor via a lead.

Claim 61 (Original): The system of claim 53, wherein the implantable medical device is
wirelessly coupled to the sensor.

Claim 62 (Previously Presented):   The system of claim 53, wherein the implantable medical
device comprises at least one of an implantable neurostimulator or an implantable pump.

Claims 63-71 (Canceled).

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Claim 72 (New):   A medical system comprising:

    a plurality of sensors, each of the sensors generating a signal as a function of at least one physiological parameter of a patient; and

    an implantable medical device that includes a processor that:

        monitors a plurality of physiological parameters of the patient based on the signals output by the sensors,

        for each of the plurality of physiological parameters, determines a respective one of a plurality of sleep metric values, each of the sleep metric values indicating a probability of the patient being asleep based on the respective physiological parameter, and

        mathematically combines the plurality of sleep metric values that each indicate that probability of the patient being asleep based on the respective one of the plurality physiological parameters to determine an overall sleep metric value that indicates an overall probability of the patient being asleep.

Claim 73 (New):   A system comprising:

    means for monitoring a plurality of physiological parameters of a patient;

    implantable means for determining a respective one of a plurality of sleep metric values for each of the plurality of physiological parameters, each of the sleep metric values indicating a probability of the patient being asleep based on the respective physiological parameter; and

    implantable means for mathematically combining the plurality of sleep metric values that each indicate that probability of the patient being asleep based on the respective one of the plurality physiological parameters to determine an overall sleep metric value that indicates an overall probability of the patient being asleep.